THE PANURGINE BEES OF NORTH DAKOTA AND A NEW EPEOLUS. (HYM.)

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Since 1910 the writer has spent as much time as other duties would permit collecting and studying the flower-visiting insects, chiefly bees, of this state. A list of the wasps had been published (Ent. News, Vol: 28, pp. 419–423, 1917) Records of some of the bees have been published as follows:

Cockerell—Can. Ent. Vol. 43, p. 390, 1911.—*Neopasites* (*Holcopasites*) *robertsoni* Cwfd. and *Andrena hirticincta* Prov.

Crawford—Can. Ent., Vol. 45, pp. 155–156, 1913.—*Prosopis stevensi*, n. sp.
—Proc. U. S. Mus., Vol. 48, p. 579, 1915.—species of *Panurginus*.
—Insec. Ins. Menst., Vol. 3, pp. 125–126, 1915.—*Holcopasites stevensi*, n. sp.

Franklin —Ent. News, Vol. 26, pp. 413–415, 1915.—species of *Bombidæ*.

Swenk —Univ. Nebr. Studies, Vol. 12, No. 1, 1912.—species of *Nomada* (3 new).
—Ibid., Vol. 15, No. 2, 1915.—species of *Nomadidæ* (8 new) and *Stelididæ*.

The present paper presents records of the *Panurgidæ* of Ashmead, and also a new *Epeolus*. Prof. Cockerell has kindly suggested that these described species were new and has looked over the descriptions. The types will be placed in the U. S. National Museum.

Family MACROPIDÆ.

Macropis morsei Robertson. (det. Crawford).

Fargo, Kensal, New Rockford, Deering, Kenmare, Pleasant Lake and Granville. Mostly at flowers of *Steironema;* at one time many of both sexes were found sucking nectar at *Lactuca pulchella* (which was growing near a quantity of *Steironema*). Occasional specimens at *Apocynum androsæmifolium* and *A. hypericifolium* (males), *Petalostemon oligophyllum*, *Onagra strigosa*, *Solidago canadensis*, *Symphoricarpos occidentalis* and *Taraxacum taraxacum;* June 26 to Aug. 11.

Family DUFOUREIDÆ.

Halictoides marginatus (Cresson). (det. Crawford).

Fargo, Valley City, Lakota, Rugby, Monango (J. F. Brenckle). Mott (J. R. Campbell), Dickinson (C. H. Waldron). A rather common bee, mostly at sunflowers (*Helianthus petiolaris*, *H. scaberrimus* and *H. tuberosus*), also at *Grindelia squarrosa;* Aug. 9 to Sept. 18.

Halictoides maurus (Cresson). (det. Crawford).

Cavalier, Valley City, Mandan, Glen Ullin, Leeds, Minot, Marmarth. A fairly common bee at flowers of *Campanula rotundifolia;* June 30 to Aug. 5.

Family PANURGIDÆ.

Perdita canadensis Crawford (det. Crawford).

Sheldon, Pleasant Lake, Williston and Dickinson (C. H. Waldron). At flowers of *Helianthus petiolaris* and *H. scaberrimus;* July 25 to Aug. 21. Some twenty of each sex and several pairs taken in copula. The male has not been described. The more strongly marked ones agree quite closely with the description of that sex of *P. lacteipennis* Swenk and Cockerell. In others the yellow markings are almost entirely absent. The mandibles are usually yellowish-

red medially, darker red apically and greenish black basally. The females agree well with the original description. The spots on the first abdominal segment are often absent, and the bands on the others are sometimes all interrupted medilly. Mr. Crawford writes that he is uncertain of the validity of the species.

Perdita bruneri Cockerell.

Fargo, Enderlin, Sheldon, Valley City, Jamestown, Bismarck, Pleasant Lake, Rugby, Minot, Schafer, Williston and Dickinson (C. H. Waldron); Aug. 6 to Sept. 15. A common bee and much the most common of the genus in the State. Only four females were taken at Fargo previous to 1917, when it was found in considerable numbers. Mostly at flowers of *Grindelia squarrosa;* also at *Chrysopsis villosa*, *Aster multiflorus* and *Helianthus petiolaris*.

Perdita swenki Crawford.

Valley City and Pleasant Lake at *Grindelia squarrosa*, *Chrysopsis villosa*, *Helianthus maximiliani* and *Solidago canadensis;* Aug. 11 and 13. Taken only the two times, although in considerable numbers at Valley City. These two species determined by Prof. Cockerell some time ago as *P. cockerelli* Cwfd. and *P. bruneri* Ckll.

Perdita tridentata, new species. (Fig. 25, 1).

Male.—Length 4 to 5.5 mm. Head and thorax greenish-blue. Yellow markings as follows: base of clypeus with a broad median and narrow marginal extensions, supra-clypeal spot about half as high as wide, lateral face marks gradually or irregularly narrowed to a point at about the upper level of antennal sockets (see Fig. 1), mandibles except tips, scape and under side of flagellum (less so on first three joints); tegulæ, wingbases and small spots on pronotum; front half of anterior legs for their entire length, a narrower stripe on intermediate ones, knees of posterior legs and often a very narrow stripe on their tibiæ; bands on first, fourth and fifth segments interrupted medially, those on second and third slightly notched.

Apex of clypeus, labrum, upper side of flagellum and a small spot on apex of scape, light brown; legs and abdomen dark brown; wings clear but nervures dark, apex of abdomen triangular but obtusely rounded.

Type No. 6372. The type is from a series of 13 specimens taken on *Helianthus petiolaris* at Pleasant Lake, North Dakota, Aug. 11, 1913. Two were taken on *H. scaberrimus* near Sheldon, Aug. 14, 1916, and one on *H. petiolaris* at the same place Aug. 21, 1918.

"A species of the *affinis* group," writes Prof. Cockerell. The abdomen is very much like that of *P. swenki* Cwfd. The clypeal marking is somewhat variable, the central extension sometimes quadrate and covering a large part of the clypeus, but more commonly rounded and shorter, the lateral extension sometimes nearly absent. In one specimen the clypeus is nearly all dark and the abdominal bands are considerably reduced. Supra-clypeal mark often notched above, sometimes almost divided.

Perdita laticincta Swenk and Cockerell.

Sheldon, Pleasant Lake and Dickinson (C. H. Waldron). All at *Helianthus petiolaris;* July 28 to Aug. 21. Prof. Cockerell has confirmed the identification of this and the next two species.

Perdita citrinella Graenicher.

Minot and Granville. At *Petalostemon oligophyllum;* July 8 and Aug. 22, five females, eleven males.

Female.—Dark sutures of head and thorax quite prominent; two specimens have tibiæ dark except knees, middle tarsi dark, ventral surface of abdomen dark medially, and scape and upper side of flagellum dark.

Male.—Closely resembles the female. Hind tibiæ usually dark behind; abdomen usually with dark triangular patches at sides of segments 2 to 5.

The males does not seem to have been previously described, although Crawford recorded* a specimen from Medicine Hat, Alberta, Canada. The markings of both sexes vary quite a little, but there is no suggestion of intergrading with the following species. In a series of eight males taken at the same time, considerable variation is known. The dark lines next the eyes are shorter than in the female, but the spots between these and the antennæ are prominent, sometimes each occupying one-fourth the width of the front; well developed spots are sometimes present at sides of lateral ocelli and small ones behind apex of eyes. Two have lateral brown lines on the mesoscutum, while one has suffused brown lines both medially and laterally, and nearly complete bands on abdomen. One has hind tarsi yellow.

Perdita perpallida Cockerell.

Sand hills near Sheldon, Aug. 12, 1916, and Aug. 21, 1918, at *Petalostemon villosum;* ten females, seven males. This species would seem to have been expected where the preceding was taken, and vice versa. This plant occurs only in this part of the State and near Pleasant Lake and Towner (not far from where *Perdita citrinella* was taken); *P. oligophyllum* and *purpureum* are common plants throughout the State.

Perdita martini Cockerell.

1895.—*Perdita martini* Cockerell, Proc. Acad. Nat. Sci. Phila., 1895, p. 14, male.

Male.—Agrees closely with the original description. The yellow on the face extends about to the middle of the anterior ocellus, its upper line irregular, being depressed under the lateral ocelli and slightly produced next the eye, a narrow line following the direction of its upper border reaching the lateral ocellus. Brown of the antennæ above mostly limited to the junctions of the first four or five joints of the flagellum; yellow on cheeks extending fully two-thirds the length of the eyes.

Meso-pleuræ with a broad yellow mark extending from front coxæ to midway between middle coxæ and tubercles; middle tibiæ with a dark spot above, posterior tibiæ dark, and femora on apical half both above and below; posterior tarsi brownish; stigma yellow, nervures brownish.

Female.—Length 5 mm. Yellow on clypeus, labrum, a low supra-clypeal spot, spot behind base of mandibles, lateral face marks extending from middle of clypeus to slightly above base of antennæ with an irregular margin, scape of antennæ and lower side of flagellum, tegulæ, tubercles and a line on prothorax connecting them. Legs with coxæ dark, trochanters yellow; anterior yellow except a spot in inner side of femora; middle with a larger spot on femora, and a small one on outer side of tibiæ; posterior dark except knees. Dark bands of

*Can. Ent. vol. 44, p. 359, 1912.

abdomen rather more pronounced than in male, the first three slightly produced backward at the sides.

Minot, North Dakota, Aug. 22, 1915. One of each sex on *Grindelia squarrosa*. Allotype No. 9293; male No. 9294. The female runs in Cockerell's table (1896) to *zonalis* Cress. or *rectangulata* Ckll. It resembles the latter in face markings. Mr. E. T. Cresson, Jr., has kindly compared these with the type of *P. martini* and considers them identical. He notes: "yellow of cheeks to ½ eye and black of occiput extends nearly to lower orbit level; mid-tibiæ not darkened, post-tibiæ darkened above, all femora immaculate; nervures pale and all pale parts more whitish than yellow." He also sends a sketch of the pleural markings, which shows a rather greater and more irregular extension of yellow on the fore part of the mesopleuræ.

Greeyleyella beardsleyi Cockerell. (det. Crawford).

1907.—*Panurginus malvastri* Swenk and Cockerell, Ent. News, Vol. 16, p. 179.

Dickinson, two females July 4, 1912 (C. H. Waldron), two females and a male July 4, 1914; Gascoyne, June 19, 1918, one pair in copula, five males and three females; Mott, July 7, one male. All at flowers of *Malvastrum coccineum*.

To the list of species *Panurginus* which Crawford has published *, a number of new localities may be added and the complete list is given, herewith. *P. innuptus, nebrascensis* and *renimaculatus* are quite common bees, the others less so.

Panurginus innuptus Cockerell.

Fargo, Nicholson, Valley City, Bismarck, Dickinson (C. H. Waldron), Marmarth, Lakota, Stanley and Minot. At flowers of *Helianthus annuus* (cult.), *H. maximiliani, H. tuberosus* and *H. strumosus, Brauneria pallida, Ratibida columnaris, Solidago canadensis, Grindelia squarrosa*, and *Centaurea jacea* (cult.); July 4 to Sept. 11.

Panurginus renimaculatus Cockerell.

Fargo, Jamestown, McKenzie, Bismarck, Dickinson (C. H. Waldron), Sentinel Butte, Grand Forks, Lakota, Crary, Perth, Devils Lake, Minot and Williston. Mostly at flowers of *Grindelia squarrosa*, occasionally at *Aster multiflorus, A. paniculatus, A. chinensis* (cult.), *Boltonia asteroides, Helianthus maximiliani* and *H. petiolaris;* Aug. 5 to Sept. 22.

In addition to the characters given by Crawford for the male, the wings are clear, and the dorsal surface of the first abdominal segment closely punctured up to the depressed apex (*nebrascensis* has smoky wings and first segment with more or less of a smooth shining space before the depressed apex, and a smooth, slightly raised median line.)

Panurginus nebrascensis Crawford.

Fargo, Valley City, Jamestown, McKenzie, Bismarck, Lakota, Crary, Devil's Lake, Granville, Minot, Tolley, Williston. Mostly at flowers of *Grindelia squarrosa*, also at *Chrysopsis villosa, Cuscuta gronovii* (1 male), *Petalosteon oligophyllum, Solidago canadensis* and *Taraxacum taraxacum;* Aug. 5 to Sept. 28.

Panurginus simulans Swenk and Cockerell.

Fargo, Williston and Dickinson (C. H. Waldron). At flowers of *Helianthus annuus* (cult.), *H. maximiliani, H. petiolaris* and *Taraxacum taraxacum;* July 28

*Proc. U. S. Mus., vol. 48, p. 579, 1915.

to Sept. 8. I have never been quite satisfied with the disposition of this species, but Mr. Crawford writes that he has twice compared it with the types.

Panurginus piercei Crawford.

Fargo, Valley City, Dickinson (C. H. Waldron), Monango (J. F. Brenckle). Mott (J. R. Campbell), Wales, Lakota, Crary and Perth. At flowers of *Grindelia squarrosa*, *Helianthus annuus* (cult.), *H. maximiliani*, *H. scaberrimus*, *H. tuberosus* and *Solidago rigida;* Aug. 8 to Sept. 16.

Two other species of *Panurginus* have been collected but not yet determined. One is a species related to *P. parvus* Rob. flying in July; the other is autumnal and probably related to some of the eastern forms.

Fig. 25.—1. *Perdita tridentata*—face markings of type.
2 and 3. *Hesperapis carinata*—dorsal (fig. 2) and laterol (fig. 3) view of seventh and eighth abdominal segment.

Hesperapis carinata, new species.

Male.—Length 10–11 mm. Black with dense ochraceous pubescence, which is paler on the face and pleuræ, also on the thorax above in some specimens; face narrowed below, about as long as the median width; vertex smooth and shining, produced but very little beyond the eyes; antennæ not elongate, black; the flagellum reddish beneath, its joints scarcely longer than wide except the first and last which are slightly so, the second half as long; maxillary palpi about 750 microns, the six joints subequal; joints of the labial palpi about 425, 425, 275 and 275 microns; mandibles toothed.

Mesoscutum rather dull, the punctures of moderate size and separated by slightly more than a puncture width; propodeum rounded, the central area very smooth and shining, the sides dull and hairy; tegulæ reddish yellow; wings hyaline, nervures and stigma honey colour, the subcosta darker; first submarginal one-half longer than second, the second narrowed a little more than half; cubital nervure very straight throughout, also the second transverse-cubital, and the basal nearly so; the basal received a little anterior of the transverse medial; legs not thickened, dark, tarsi reddish yellow, the claws deeply cleft.

Abdomen dull, first segment more shining and with a thin ochraceous pubescence; the others with short black hairs and a few scattered ochraceous ones especially on the second and third; all with prominent apical ochraceous bands; seventh dorsal segment punctured at the base and with ochraceous pubescence at base and on the sides, testaceous, smooth and shining with a high, Y-shaped carina; eighth ventral somewhat narrowed and rounded at apex. (Fig. 25—2, 3).

Ten males, at flowers of *Helianthus scaberrimus* in the sand hills near Sheldon, North Dakota; August 12, 1916. Type No. 9681. Also six males at *H. petiolaris*, same place August 21, 1918. This runs in Cockerell's table (Psyche, 1916, p. 176) to *larreæ*, but Prof. Cockerell writes that the superficial resemblance is

rather to *rhodocerata*—"has quite the appearance of some *Hesperapis*, but is a peculiar and isolated species." The finding of a species of this genus previously known only from the southwestern United States, presents another interesting question in the status of this group. The first lot were taken early in the forenoon on a misty day and were inactive. The second trip proved too much the same to shed any further light on their habits.

Calliopsis coloradensis (Cresson).

Fargo, Valley City, Jamestown, Bismarck, Sentinel Butte, Lakota, Crary, Devils Lake, Perth, Granville, Minot and Williston. A common bee, usually at flowers of *Grindelia squarrosa*, also at *Chrysopsis villosa;* Aug. 4 to Sept. 10. Specimens of this species have been examined by both Cockerell and Crawford.

Calliopsis nebrascensis Crawford. (det. Crawford).

Valley City, July 26, 1913. A number at flowers of *Verbena hastata.*

Calliopsis andreniformis Smith. (det. Cockerell).

Fargo, Aug. 24 and 26, 1912. One female and two males at flowers of *Melilotus alba.* Another female on *Solidago canadensis*, Fargo, Sept. 11, 1917, is referred by Cockerell to var. *rhodophilus* Ckll.

Protandrena asclepiadis Cockerell. (det. Crawford).

Minot, Aug. 22, 1915, 2 females; Marmarth, July 4, 1918, eight females, ten males. At flowers of *Lactuca pulchella*, *Petalostemon oligophyllum*, *Symphoricarpos occidentalis* and *Astragalus gracilis* (males, about sunset).

Epeolus dacotensis, new species.

Female.—Length 12–14 mm., stout, black with four white abdominal bands which are broad, entire and nearly straight; sparse white appressed pubescence on margins of mesoscutum especially anteriorly, on collar, metanotum, tubercles and a small patch behind them, a few on base of abdomen and sides of fifth segment; otherwise entirely black; a few erect, black hairs on upper part of face, vertex, cheeks, pleuræ and mesoscutum.

Clypeus with close, shallow punctures and scattered larger ones; face slightly narrowed below; maxillary palpi with only one evident free joint which is about .3 mm. long; central lobes of mesoscutum large, low and rounded, the lateral ones small, indistinctly pointed; mesonotum coarsely and somewhat confluently punctured; wings dark, the second submarginal narrowed nearly to a point, third not narrowed; abdomen broad, band on first segment broader than the rest, concase medially (from the base of the abdomen); last two bands slightly curved at the sides; fifth segment with a large differentiated area which is scarcely at all flattened.

Male.—Entirely similar, length 12–13 mm.; apex of abdomen truncate.

Williston, North Dakota; one female (type No. 8969) Aug. 8, four males Aug. 14, 1915; one of the males on flowers of *Helianthus petiolaris*, the other, at a clay bank; Marmarth, North Dakota, July 4, 1918, two females on *Lactuca pulchel a* and one on *Helianthus petiolaris.* A very distinct and striking species probably parasitic on *Anthophora occidentalis* and *A. neomexicana*, colonies of the former nesting at Williston, the latter at Marmarth. One of the Marmarth females has the pale pubescence more abundant on the mesonotum, and extending considerably on the mesopleuræ and a little on the outer sides of the legs, especially the tibiæ.